

A chemical structure of a complex molecule, likely a steroid or a similar polycyclic compound. It features a five-membered ring on the left with two hydroxyl groups (HO-). A large, bold downward-pointing arrow is positioned above the central part of the molecule. The molecule has a long side chain on the right that includes a carboxylic acid group (COOH) and several other functional groups, including hydroxyl groups (OH) and a ketone group (C=O).

BEST AVAILABLE COPY

August 16, 1982
Volume 60, Number 33
CENEAR 60 (33) 1-56
ISSN 0009-2347

Chemical & Engineering

NEWS

4 Letters

5 Editor's Page

Concentrates

9 Business

19 Government

24 Science/Technology

The Department's

45 ACS News

56 Newsclips

News of the Week

- **Gulf Oil's decision** not to take it over leaves Cities Service vulnerable to other, low-cost bids; company may liquidate if another buyer cannot be found. **Page 6**
- **Chemical industry lost** a number of changes it had hoped for in House-passed pesticides control laws. **Page 7**
- **Patent office rejects** Stanford University application for products patent based on genetic engineering techniques. **Page 7**
- **Executive order on classifying information** for national security reasons criticized by House committee. **Page 7**
- **George C. Pimental** withdraws as candidate for 1983 ACS president-elect; F. Albert Cotton and petition candidate Warren D. Niederhauser will vie for post. **Page 8**
- **Ceramics research center** at Rutgers University, set up by NSF grant, will receive support from six industrial firms. **Page 8**

Business

- **Recession continues to batter chemical company earnings**; first-half results indicate one of the worst years for the industry if demand doesn't pick up. **Page 10**

International

- **Major Canadian chemical companies** continue to experience deepest economic slump since the 1930s; only one company has shown profits this year. **Page 18**

Government

- **Pollution bills, other legislation** slow to be approved by Congress; Clean Air and Clean Water acts still in rewrite stage. **Page 20**
- **New bills being introduced in Congress** to try to halt trend toward national scientific illiteracy. **Page 22**

Science

- **Synthesis of dodecahedrane** opens doors to studies of the fundamental nature of all organic compounds. **Page 25**
- **Fredricamycin A** shows promise as antitumor drug and antibiotic. **Page 27**

Technology

- **Stauffer's Pro-Drone** controls fire and infestation by creating an excess of idle insects, shortage of worker ants. **Page 27**

Education

- **Master's degree program** in chemical engineering set up by Columbia University and Exxon Research & Engineering. **Page 29**

Special Report

The arachidonic acid cascade includes prostaglandins, thromboxanes, and many other biochemically important products of enzymic oxidation of the acid. **Page 30**

Chemical company earnings continue plunge

If the first half is any indication, 1982 will end up with the worst profit drop and the lowest profit margin for the industry in years

William J. Storck, C&EN,
New York, and William F. Fallweil,
C&EN, Washington

In a few months, U.S. chemical producers will look back on 1982 with a mixture of relief that it is over and hope that it never happens again.

Projected from what has happened so far, negative superlatives looming for 1982 include the industry's worst profit drop and lowest profit margin

in recent decades. In a nutshell, C&EN's midyear survey of the 40 leading basic chemical companies projects a profit drop of at least 20% for the year on a sales drop of at least 3%. Profit margin on sales will be the lowest ever at less than 5%.

For the second quarter, profits of these chemical companies fell 36% from a year ago as sales slipped 8%. The average second-quarter profit margin was 4.4%. These results are particularly bad, since the second quarter is traditionally the industry's strongest of the year.

The industry has come to this pass because the current recession has lasted too long—running off and on for three years since 1979. The industry finds itself with tremendous price discounting and record low plant use rates when demand is still weakening. This is in sharp contrast

to the 1975 recession, when the chemical industry began to recover before prices slid. The softening of prices in mid-decade did not hit until 1976. By that time, the recession was over, and demand was starting to pick up.

This time around, there is nothing like renewed markets to buffer prices, which have been smashed 30 to 40% for many basic chemicals and polymers. As a result, chemical sales will decline 3 to 7% in 1982, and earnings will drop 20 to 30% from last year. Profit margin on sales will touch bottom at 4.0 to 4.6%. Even during the 1975 recession, profit margin for the 40 firms on the C&EN list of chemical companies stayed high at 8.6%, falling to 6.2% in 1976.

Some economists, such as Charles B. Reeder of Du Pont, still are predicting the beginning of a recovery

Chemical industry leaders for second-quarter 1982 ...

Sales			Earnings ^a			Profitability		
Rank	\$ Millions	Rank 1981	Rank	\$ Millions	Rank 1981	Earnings as % of sales	Rank	Rank 1981
1 Dow Chemical	\$2728.0	1	Union Carbide	\$118.2	2	International Flavors	16.0%	3
2 Union Carbide	2290.4	2	Monsanto	88.2	5	Nalco Chemical	9.9	5
3 W. R. Grace	1630.2	4	Allied	82.0	3	Petrolite	9.7	8
4 Monsanto	1623.4	3	Dow Chemical	77.0	1	Freeport-McMoran	8.8	1
5 Allied	1595.0	5	W. R. Grace	76.9	4	Great Lakes Chemical	8.0	4
6 FMC	904.8	9	PPG Industries	45.7	6	Philip A. Hunt	6.7	14
7 American Cyanamid	901.1	7	FMC	39.0	8	Air Products	6.4	9
8 PPG Industries	882.1	8	American Cyanamid	31.4	7	Liquid Air	6.4	11
9 B. F. Goodrich	793.5	10	Rohm & Haas	28.0	13	Chemed	6.2	6
10 Celanese	778.0	6	Ethyl	27.9	17	Lubrizol	6.2	7

... and for first-half 1982

Sales			Earnings ^a			Profitability		
Rank	\$ Millions	Rank 1981	Rank	\$ Millions	Rank 1981	Earnings as % of sales	Rank	Rank 1981
1 Dow Chemical	\$5509.0	1	Monsanto	\$233.7	3	International Flavors	15.6%	2
2 Union Carbide	4611.5	2	Union Carbide	209.0	2	Freeport-McMoran	11.3	1
3 Monsanto	3351.1	3	Dow Chemical	174.0	1	Stauffer Chemical	10.6	5
4 Allied	3208.0	5	W. R. Grace	156.0	4	Petrolite	10.0	8
5 W. R. Grace	3093.4	4	Allied	145.0	5	Nalco Chemical	9.8	4
6 FMC	1749.4	9	Stauffer Chemical	99.3	7	Great Lakes Chemical	8.6	3
7 American Cyanamid	1746.6	7	FMC	69.5	10	Chemed	7.4	9
8 Celanese	1638.0	6	PPG Industries	62.2	6	Liquid Air	7.0	12
9 PPG Industries	1600.0	8	American Cyanamid	59.6	8	Monsanto	7.0	14
10 B. F. Goodrich	1500.0	10	Air Products	53.5	16	Air Products	6.9	11
						Lubrizol	6.9	6

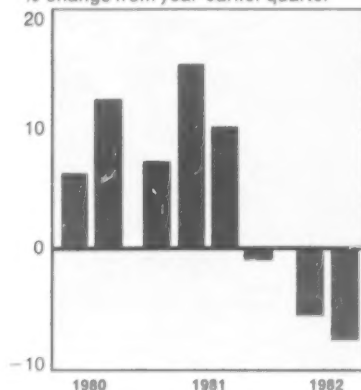
^a After taxes. Note: For 40 chemical companies on page 12.

Chemical industry 1982 second-quarter results

- Sales fell 8%
- Earnings plunged 36%
- Profit margin was 4.4%
- Production declined 11%
- Prices rose 2.3%

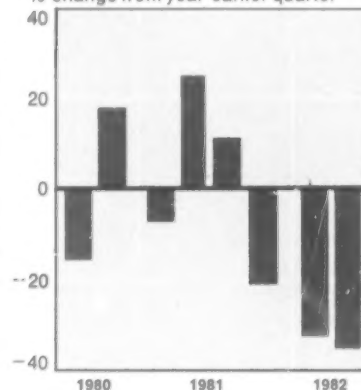
Sales

% change from year-earlier quarter



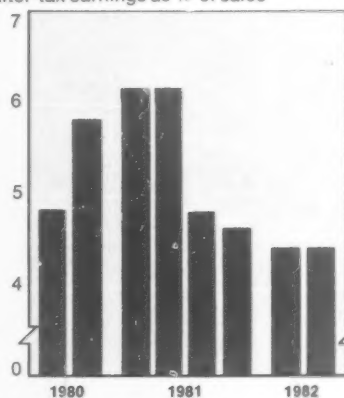
Earnings

% change from year-earlier quarter



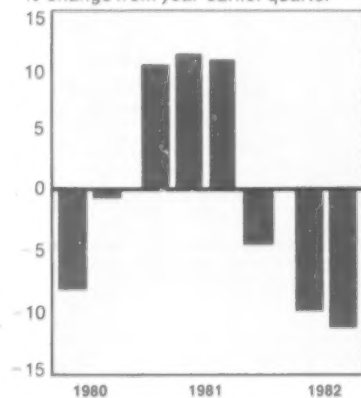
Profit margins

After-tax earnings as % of sales



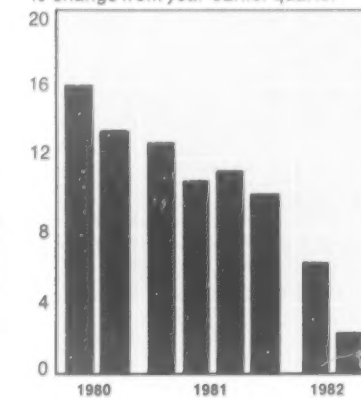
Production

% change from year-earlier quarter



Prices

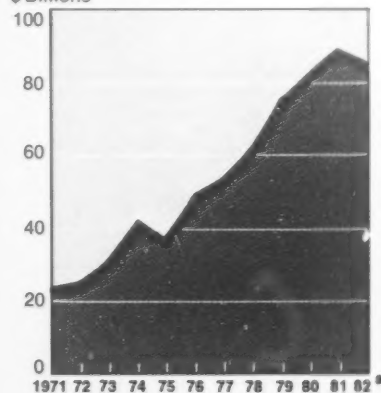
% change from year-earlier quarter



Sales in 1982 will fall about 3% and earnings will drop more than 20%, driving chemical profitability down to about 4.6%

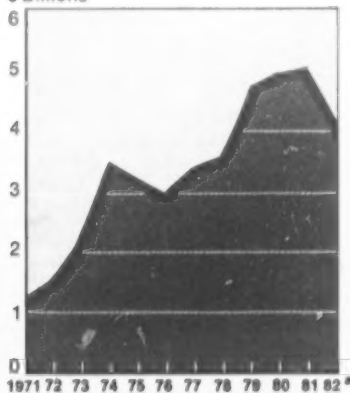
Annual sales

\$ Billions



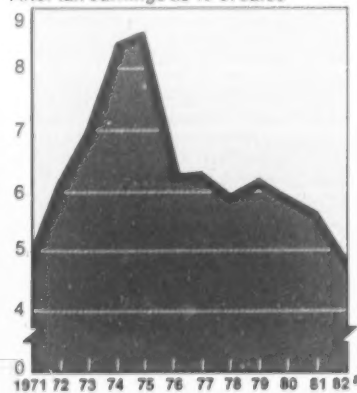
Annual earnings

\$ Billions



Annual profit margins

After-tax earnings as % of sales



a C&EN estimates. Note: All sales, earnings, and profit margin data are based on the combined performance of the 40 largest chemical companies listed on page 12.

Earnings for 40 largest chemical companies in first half down 36% from 1981

	SECOND-QUARTER 1982						FIRST-HALF 1982			
	Sales	Earnings	Change from 1981		Profit margin ^a		Sales	Earnings	Change from 1981	
	(\$ millions)		Sales	Earnings	1982	1981	(\$ millions)		Sales	Earnings
Dow Chemical ^d	\$ 2,728.0	\$ 77.0	-11%	-54%	2.8%	5.5%	\$ 5,509.0	\$ 174.0	-8%	-50%
Union Carbide	2,299.4	118.2	-14	-35	5.1	6.8	4,611.5	209.0	-13	-40
W. R. Grace ^c	1,630.2	76.9	-4	-23	4.7	5.9	3,093.4	156.0	-3	-15
Monsanto	1,623.4	86.2	-13	-8	5.3	5.1	3,355.1	233.7	-11	-13
Allied	1,595.0	82.0	-1	-6	5.1	5.5	3,209.0	145.0	-1	-15
FMC	904.8	39.0	8	-13	4.3	5.4	1,749.4	69.3	6	-23
American Cyanamid ^f	901.1	31.4	0	-35	3.5	5.0	1,746.6	59.8	-2	-36
PPG Industries ^g	882.1	45.7	-1	-29	5.2	7.2	1,600.0	62.2	-6	-48
B. F. Goodrich ^h	793.5	15.0	-4	-43	1.9	3.2	1,500.0	-3.4	-6	def
Celanese	778.0	18.0	-21	-55	2.3	4.0	1,638.0	38.0	-14	-50
Hercules	651.0	22.3	-9	-46	3.4	5.8	1,291.0	44.2	-6	-48
Williams Cos.	558.0	19.4	-3	-49	3.5	6.6	952.0	25.3	-11	-72
Rohm & Haas ⁱ	528.0	28.0	-3	-17	5.3	6.2	1,003.3	44.0	-2	-28
Olin	474.2	23.4	-13	-29	4.9	6.0	973.9	45.4	-9	-26
National Distillers ^j	464.9	22.3	-11	-37	4.8	6.8	929.3	39.2	-10	-44
Ethyk ^k	417.6	27.9	-8	14	6.7	5.4	820.3	45.1	-7	2
International Minerals ^l	400.7	4.7	-15	-84	1.2	6.3	819.8	28.2	-19	-63
Air Products ^m	380.7	24.2	-2	-14	6.4	7.2	779.7	53.5	-3	-18
Witco Chemical	335.9	8.9	0	-14	2.7	3.1	669.9	12.8	2	-21
Stauffer Chemical	305.6	17.2	-19	-25	5.6	6.1	935.9	99.3	-7	-11
Akzona	254.8	-4.3	-19	def	def	1.8	545.4	-7.0	-12	def
Pennwalt	253.7	11.0	-9	-30	4.3	5.6	500.4	17.2	-9	-33
Lubrizol	220.7	13.6	-8	-48	6.2	10.8	422.5	29.2	-9	-42
Reichhold Chemicals	218.8	3.8	-14	-46	1.7	2.8	432.7	7.1	-12	-39
Thiokol	210.7	9.5	19	8	4.5	5.0	413.6	18.5	18	9
Freeport-McMoRan	175.0	15.4	-16	-64	8.8	20.5	369.9	49.1	-15	-54
Nalco Chemical	166.1	16.4	1	-16	9.9	11.9	324.9	31.8	1	-18
GAF ⁱ	163.4	8.9	-6	107	5.4	2.5	302.9	5.1	-14	-31
International Flavors	123.5	19.8	3	-8	16.0	17.9	242.1	37.8	-1	-10
Liquid Air	120.3	7.8	10	3	6.4	6.9	223.8	15.6	2	-3
H. B. Fuller ⁿ	83.0	3.0	-2	-21	3.6	4.5	155.6	4.0	-4	-38
Petrolite	74.9	7.3	0	-3	9.7	10.0	157.3	15.8	8	9
Chemed	64.8	4.0	2	-30	6.2	10.9	124.7	9.2	2	-14
First Mississippi	62.1	3.5	-4	-72	5.6	19.4	113.8	4.7	-12	-64
Crompton & Knowles	55.9	1.3	-15	-46	2.3	3.6	110.0	2.1	-13	-50
Loctite	54.4	3.2	-3	10	5.9	4.7	109.2	6.5	-3	16
Stepan Chemical	52.4	1.4	-6	-25	2.7	3.3	106.5	2.4	1	-20
Essex Chemical	47.1	2.6	-10	4	5.5	4.8	84.8	3.4	-8	21
Great Lakes Chemical	40.1	3.2	16	-32	8.0	13.6	82.8	7.1	19	-29
Philip A. Hunt	29.7	2.0	4	8	6.7	6.6	59.8	4.0	9	38
Total 20 largest companies	\$18,652.1	\$787.7	-7.9%	-35.6%	4.2%	6.0%	\$37,186.9	\$1580.8	-6.9%	-34.6%
Total 20 other companies	\$2,471.4	\$133.4	-4.6%	-34.7%	5.4%	7.9%	\$4,882.7	\$263.6	-5.5%	-31.3%
Grand total	\$21,123.5	\$921.1	-7.6%	-35.5%	4.4%	6.2%	\$42,069.6	\$1844.4	-6.8%	-34.1%

a After-tax income as a percentage of sales. b Fully diluted before nonrecurring and extraordinary items. c As of July 30. d Excludes \$120 million nonrecurring gain in second-quarter 1982, \$57 million extraordinary credit in first-quarter 1982, and \$20 million nonrecurring gain in second-quarter 1981. e Excludes \$65.1 million nonrecurring gain in first-half 1982. f Excludes net nonrecurring charge of \$3.4 million in second-quarter 1982, net gain of \$3.4 million in second-quarter and first-half 1981, and net gain of \$6.2 million in first-half 1982. g Excludes \$7.2 million nonrecurring gain in first-half 1982. h Excludes nonrecurring gains of \$4.4 million in second-quarter 1982 and \$18 million in first-half 1981. i Excludes nonrecurring charge of \$13.4 million

sometime in the second half of this year. They say that the economy already has hit bottom. Businessmen echo such hopes but have little hard evidence to back them up.

Other economists, however, are having none of this. For example, Irwin L. Kellner, senior vice president and chief economist for Manufac-

turers Hanover Trust, says that forecasters who see a strong upturn in the second half of the year are ignoring important negative signals given off by the economy. Although proponents of a second-half pickup in economic activity point to new growth that the Federal Reserve Board will allow in the monetary aggregates,

Kellner says "they fail to take into account the fact that the demand for money continues to overwhelm the supply."

In terms of consumer spending, Kellner thinks that the 10% tax cut and the 7.5% rise in social security benefits are not only too small to boost spending, but are more than

FIRST-HALF 1982 Profit margin ^a		12-MONTH RUNNING DATA				STOCK MARKET DATA ^c							
						Earnings per share ^b		Stock price			Price earnings ratio July 30	Annual indicated dividend	Dividend yield, % of price
		Change from 1981 Sales Earnings	Profit margin ^a 1982 1981	2nd qtr	Recent 12 months	July 30	Recent 12 months High Low						
1982	1981												
3.2%	5.8%	-5%	-42%	3.5%	5.8%	\$0.40	\$2.36	\$20 ¹ / ₄	\$31 ⁷ / ₈	\$19 ⁷ / ₈	9	\$1.80	8.9%
4.5	6.6	-9	-25	6.3	5.1	1.71	7.09	42 ⁵ / ₈	57 ³ / ₈	40 ¹ / ₈	6	3.40	8.0
5.0	5.8	-1	6	5.2	4.9	1.57	6.40	30 ¹ / ₄	51	30 ¹ / ₄	5	2.80	9.3
7.0	7.2	-6	1	5.2	4.9	2.39	8.75	63 ³ / ₄	80 ⁵ / ₈	56 ⁵ / ₈	7	4.00	6.3
4.5	5.4	9	-5	4.9	5.6	2.01	7.69	34 ¹ / ₂	54 ³ / ₈	28 ³ / ₄	4	2.40	7.0
4.0	5.5	7	15	4.7	4.4	1.06	4.55	25 ³ / ₈	31 ³ / ₈	23 ¹ / ₈	8	1.60	6.3
3.4	5.2	1	0	4.9	5.0	0.65	3.69	28 ³ / ₄	31 ³ / ₄	24 ³ / ₈	8	1.75	6.1
3.9	7.0	-1	-32	4.7	6.9	1.33	4.68	35 ⁵ / ₈	47 ³ / ₄	29	8	2.36	6.6
def	2.2	-3	-13	1.9	2.1	0.70	2.29	16 ⁷ / ₈	24 ¹ / ₂	16 ⁷ / ₈	7	1.56	9.2
2.3	4.0	-4	-24	3.0	3.8	1.05	6.05	42 ¹ / ₄	64 ³ / ₈	41 ³ / ₄	7	4.00	9.5
3.4	6.1	1	-4	4.7	4.9	0.51	2.81	17 ¹ / ₄	24 ¹ / ₂	16 ⁷ / ₈	6	1.32	7.7
2.7	8.4	-11	-71	2.1	6.5	0.65	1.52	14 ¹ / ₈	34 ³ / ₄	14	9	1.20	8.5
4.4	6.0	1	-20	4.3	5.4	2.17	5.66	50	68 ¹ / ₄	45 ¹ / ₂	9	2.80	5.6
4.7	5.7	-3	-11	4.0	4.4	0.99	3.25	16 ¹ / ₂	24 ¹ / ₂	16 ¹ / ₄	5	1.20	7.3
4.2	6.7	-2	10	6.1	5.5	0.61	3.37	20 ¹ / ₄	26 ¹ / ₈	18 ⁷ / ₈	6	2.20	10.9
5.5	5.2	-2	4	5.1	5.4	1.34	4.55	22 ³ / ₈	28 ³ / ₄	18 ¹ / ₈	5	1.50	6.7
3.4	7.6	-16	-40	5.7	8.0	0.18	3.58	24 ⁷ / ₈	46 ¹ / ₄	24 ⁵ / ₈	7	2.60	10.5
6.9	8.1	1	-3	7.5	7.8	0.84	4.01	27	40 ¹ / ₄	26	7	0.80	3.0
1.9	2.5	3	-1	2.7	2.8	0.63	3.80	21	31 ¹ / ₂	20 ⁵ / ₈	6	1.80	8.6
10.6	11.0	-6	-3	8.3	8.1	0.43	3.15	18 ⁷ / ₈	24 ³ / ₄	17	6	1.44	7.6
def	1.4	-2	def	def	0.5	-0.35	-0.23	15 ³ / ₄	16 ¹ / ₈	7 ⁷ / ₈	—	0.20	1.3
3.4	4.7	-21	-21	3.4	3.4	1.06	3.16	23 ⁵ / ₈	31 ¹ / ₂	23 ¹ / ₈	7	2.20	9.3
6.9	10.8	-9	-11	9.8	10.0	0.34	1.81	15	26 ³ / ₄	14 ¹ / ₄	8	1.08	7.2
1.6	2.4	-4	-31	1.7	2.3	0.44	1.70	10 ⁷ / ₈	15 ³ / ₄	10	6	0.48	4.4
4.5	4.9	9	26	4.9	4.3	0.82	3.30	39 ¹ / ₄	46	26 ¹ / ₂	12	1.20	3.1
11.3	21.2	-2	-35	14.1	21.2	0.23	1.62	13 ⁷ / ₈	37 ¹ / ₂	13 ¹ / ₈	9	0.60	4.3
9.8	12.1	5	-4	11.1	12.1	0.41	3.30	19 ⁵ / ₈	27 ³ / ₄	18 ⁵ / ₈	6	1.12	5.7
1.7	2.1	-12	def	def	1.4	0.50	-1.79	10 ¹ / ₄	15 ¹ / ₄	8 ⁵ / ₈	—	0.20	2.0
15.6	17.3	1	-17	12.6	15.3	0.54	1.56	23	23 ⁵ / ₈	17 ³ / ₈	15	1.00	4.3
7.0	7.7	4	5	7.1	7.0	0.60	2.52	17 ¹ / ₄	22 ¹ / ₂	16 ¹ / ₄	7	1.60	9.3
2.6	4.0	6	-8	3.4	4.0	0.65	2.41	16 ³ / ₄	26 ¹ / ₂	14 ¹ / ₄	7	0.52	3.1
10.0	9.9	12	6	9.4	9.9	0.61	2.44	26 ¹ / ₄	37	24 ³ / ₄	11	1.00	3.8
7.4	8.8	7	22	9.4	8.2	0.47	1.51	23 ¹ / ₂	25 ⁵ / ₈	21 ⁵ / ₈	16	1.25	5.3
4.1	10.1	-8	-57	4.2	8.8	0.17	0.52	8 ¹ / ₈	22 ³ / ₈	7 ³ / ₄	16	0.24	3.0
1.9	3.3	-7	-16	2.9	3.1	0.35	1.81	13	18 ¹ / ₈	12 ¹ / ₈	7	1.04	8.0
6.0	5.0	1	39	6.7	4.9	0.32	1.45	18 ³ / ₈	26 ¹ / ₂	18 ¹ / ₈	13	0.56	3.0
2.3	2.8	10	21	2.8	2.6	0.39	1.60	10 ¹ / ₈	21 ³ / ₈	10 ¹ / ₈	6	0.56	5.5
4.8	3.7	-4	0	4.8	4.6	0.90	2.72	17 ¹ / ₈	20 ¹ / ₄	15 ⁷ / ₈	6	0.80	4.7
8.6	14.4	21	-23	9.3	14.6	0.44	2.00	27 ¹ / ₂	48 ¹ / ₈	26 ³ / ₈	14	0.52	1.9
6.7	5.3	8	def	4.1	def	0.35	1.14	10 ³ / ₄	11 ¹ / ₄	8 ³ / ₈	9	0.40	3.7
4.3%	6.0%	-2.6%	-16.6%	4.6%	5.4%								
5.4%	7.4%	-2.7%	-21.0%	5.5%	6.7%								
4.4%	6.6%	-2.6%	-17.2%	4.7%	5.5%								

In second-quarter 1981 and net nonrecurring charge of \$9.0 million for first-half 1981. j Excludes net nonrecurring loss of \$4.3 million in second-quarter 1982 and net nonrecurring gain of \$7.2 million in first-half 1982. k Second-quarter 1982 includes results from First Colony Life Insurance from May 14. l Includes nonrecurring items. m Excludes \$9.3 million nonrecurring charge in second-quarter 1982. n Excludes \$0.9 million extraordinary gain in first-half 1982. def = deficit.

wiped out by increases in taxes, fees, and utility rates at the state and local levels.

"If the consumer doesn't come through and lift his/her outlays dramatically starting this quarter," Kellner says, "then business inventories may not be in as good shape as some think." The ratio of business

inventories to shipments in June was a distressingly high 1.8, compared with 1.7 in June 1981. For chemicals and allied products the ratio is moderately high at about 1.4, the same as in June 1981.

Kellner adds that even if consumers do increase their spending somewhat over the coming months, they

will be more likely to buy small-ticket items that won't contribute much to the economic recovery. Autos and houses, which are big chemical markets, still would languish.

The National Association of Purchasing Management, source of the first hard data on monthly manufacturing activity, also has weighed in

Both sales and earnings fall at chemical-producing petroleum companies

	% chemical sales	SECOND-QUARTER 1982						FIRST-HALF 1982		
		Sales (\$ millions)	Earnings (\$ millions)	Change from 1981		Profit margin ^a		Sales (\$ millions)	Earnings (\$ millions)	Change from 1981 Sales
				Sales	Earnings	1982	1981			
Exxon	7%	\$25,262.0	\$885.0	-8%	-52%	3.5%	6.6%	\$52,371.0	\$2125.0	-9%
Mobil	3	15,754.0	310.0	-5	-56	2.0	4.2	32,193.0	636.0	-4
Texaco	3	11,500.0	305.0	-22	-45	2.7	3.8	24,500.0	672.0	-19
Standard Oil of California	3	9,370.0	263.0	-15	-57	2.8	5.6	19,390.0	493.0	-16
Standard Oil (Ind.)	11	7,549.0	382.0	-7	-31	5.1	6.8	14,714.0	852.0	-8
Gulf Oil	8	7,426.0	210.0	3	-32	2.8	4.3	14,964.0	477.0	-1
Atlantic Richfield	10	6,808.9	409.8	-2	3	6.0	5.7	13,236.0	795.2	-6
Shell Oil	15	5,105.0	380.0	-8	-7	7.4	7.4	9,947.0	724.0	-9
Occidental Petroleum^b	15	4,300.3	66.4	37	-52	1.5	4.5	8,512.0	128.5	31
Phillips Petroleum	15	4,030.0	139.9	-1	-39	3.5	5.6	7,843.0	328.7	-16
Sun Co.^b	5	4,000.0	110.0	3	-33	2.8	4.2	8,000.0	234.0	1
Tenneco^b	10	3,735.0	159.0	0	-22	4.3	5.4	7,549.0	287.0	0
Standard Oil (Ohio)	3	3,156.8	473.2	-2	-1	15.0	14.9	6,212.4	927.9	-3
Getty Oil	2	3,078.3	151.5	-4	-26	4.9	6.4	6,202.9	315.4	-5
Union Oil^b	11	2,909.7	197.6	4	8	6.8	6.6	5,391.3	366.1	-2
Cities Service	3	2,178.9	74.4	0	-27	3.4	4.7	4,456.3	127.7	2
El Paso	15	956.4	18.2	5	-52	1.9	4.1	1,890.4	39.4	4
Kerr-McGee^b	14	911.9	50.2	2	-2	5.5	5.8	1,848.5	96.4	2
Internorth	10	721.4	22.5	-2	-44	3.1	5.4	2,174.2	129.1	16
American Petrofina	13	608.0	10.9	-15	-29	1.8	2.1	1,183.2	26.9	-14

^a After-tax income as percentage of sales. ^b Excludes major nonrecurring earnings: Occidental Petroleum—\$93 million in first-quarter 1981; Sun Co.—\$135 million in second-quarter 1981; Tenneco—\$73 million in second-quarter 1982; Union Oil—\$24.4 million in second-quarter 1981; Kerr-McGee—\$17 million charge in second-quarter 1982.

Petrochemical recession enters third year

For most of the U.S. economy, the current recession began last summer and, according to many analysts such as Du Pont's chief economist Charles B. Reeder, could yield to a modest recovery in the second half of 1982. But not for petrochemicals.

Chemical operations at petroleum companies are in the same dark corner of the economic woods as are the auto and housing industries. These petrochemicals' recession started, in terms of earnings drops, in third-quarter 1980, and it is plunging into a third year without letup. Every quarter has brought further decline for oil and natural gas firms' chemicals, which account for one sales dollar out of every four for the entire U.S. chemical industry. Oil and gas com-

panies have the largest stake in chemicals outside basic chemical companies.

Second-quarter performance this year for chemicals in the petroleum sector was dreadful, worse again than results for basic chemical companies. The top 40 basic chemical companies had a year-to-year earnings drop of 36% and chemicals at five leading oil and gas companies had a combined after-tax earnings decline of 51%. This pulls chemical profits for these five firms down about two thirds from the last good quarter at the beginning of 1980. For the first half of 1982, earnings fell 42% from the first half of 1981.

The underlying problem for petrochemicals continues to be a wrenching

dropoff in physical product volume, which exacerbates low use of plant capacity and exaggerates discounts from list prices. Exxon's volume drop in the first half was 11% in the U.S. and 7% abroad, contributing to a 57% profits plunge, says chairman Clifton C. Garvin Jr. Exxon's chemical product revenue fell 16% in the half from first-half 1981.

Much the same thing happened at Mobil and other oil companies. Mobil posted a chemical sales drop of 10% for the first six months (12% in the second quarter), leading to a 44% first-half profits decline. Mobil lays these results to lower U.S. petrochemical and phosphate rock earnings. Similarly, Shell Oil reported chemical revenue and pretax earnings drops of 14% and 60% in the second quarter and 11% and 24% for the first half. Even worse, at Gulf Oil and Atlantic Richfield, pretax chemical earnings were in the red.

Atlantic Richfield gives some startling figures on the volume loss in particular chemical categories. In aromatics, the company's year-to-year sales poundage fell 30% in the second quarter and 32% in the first half. Corresponding declines in other classes were 62% and 89% in olefins and 5% and 15% in polymers.

\$ Millions	AFTER-TAX EARNINGS					
	Second quarter			First half		
	1982	1981	% change	1982	1981	% change
Exxon	\$ 36	\$ 96	-62%	\$ 67	\$157	-57%
Mobil	17	27	-37	30	53	-43
Shell Oil	6	15	-60	16	21	-24
Standard Oil (Ind.)	42	52	-19	83	91	-9
Texaco	5	27	-80	20	49	-59
TOTAL	\$106	\$217	-51%	\$216	\$371	-42%

FIRST-HALF 1982			STOCK MARKET DATA							
Change from 1981 Earnings	Profit margin ^a		Earnings per share		Stock price			Price-earnings ratio July 30	Annual indicated dividend	Dividend yield, % of price
	1982	1981	2nd qtr	Recent 12 months	July 30	Recent 12 months High	Low			
-38%	4.1%	5.9%	\$1.02	\$4.92	\$26	\$36	\$26	5	\$3.00	11.5%
-53	2.0	4.0	0.74	4.09	20 ³ / ₄	32	20 ³ / ₄	5	2.00	9.6
-45	2.7	4.0	1.17	6.79	26 ³ / ₄	39 ¹ / ₂	26 ³ / ₄	4	3.00	11.2
-62	2.5	5.6	0.77	4.65	25 ¹ / ₄	46	25	5	2.40	9.5
-8	5.8	5.8	1.31	6.01	35 ¹ / ₂	64 ¹ / ₈	34 ¹ / ₈	6	2.80	7.9
-22	3.2	4.1	1.15	5.82	26 ¹ / ₄	41 ³ / ₈	24 ⁷ / ₈	5	2.80	10.7
4	6.0	5.4	1.62	6.74	36 ¹ / ₄	54 ¹ / ₈	33 ¹ / ₈	5	2.40	6.6
-6	7.3	7.0	1.23	5.36	31 ⁵ / ₈	49 ¹ / ₄	27 ¹ / ₈	6	1.80	5.7
-57	1.5	4.6	0.46	3.95	17 ¹ / ₄	30 ³ / ₈	17 ¹ / ₈	4	2.50	14.5
-34	4.2	6.0	0.92	4.65	25 ³ / ₄	47 ¹ / ₈	25 ³ / ₈	6	2.20	8.5
-17	2.9	5.3	0.90	4.79	29 ¹ / ₈	48 ³ / ₄	28 ¹ / ₈	6	2.30	7.9
-28	3.8	5.3	1.14	5.02	23 ¹ / ₂	43 ⁵ / ₈	22 ⁷ / ₈	5	2.60	11.1
-7	14.9	15.6	1.94	7.63	28	54 ¹ / ₈	26 ⁷ / ₈	4	2.60	9.3
-28	5.1	6.7	1.87	9.01	47 ³ / ₈	79 ³ / ₄	41 ¹ / ₄	5	2.60	5.5
8	6.8	6.2	1.14	4.58	24 ⁷ / ₈	45 ⁵ / ₈	24 ⁵ / ₈	5	1.00	4.0
-24	2.9	3.8	0.95	3.11	54 ¹ / ₈	69 ¹ / ₈	23 ³ / ₄	17	1.60	3.0
-43	2.1	3.8	0.37	2.44	15 ¹ / ₈	28 ¹ / ₈	14 ⁵ / ₈	6	1.48	9.8
2	5.2	5.2	0.95	4.08	26 ⁵ / ₈	43 ³ / ₄	22 ⁵ / ₈	7	1.10	4.1
-18	5.9	8.3	0.50	4.83	21 ⁷ / ₈	36	21 ¹ / ₂	5	2.12	9.7
-24	2.3	2.6	1.01	6.08	53 ¹ / ₄	63 ³ / ₈	41 ¹ / ₂	9	3.20	6.0

against the bottom-out thesis. In its report on July business, the group says quite tersely, "There is no evidence at all of any pickup in the industrial sector." Most chemical businessmen agree in their midyear reports.

Even if the rosier view prevails and economic recovery begins soon, it will take some time to make itself felt in the chemical industry. The problem is that industries such as textiles, autos, and construction—leading chemical outlets—remain depressed, with little relief in sight. These industries are at their lowest levels in years, and even if they stir slightly, upturns will take time to restore chemicals to normal earnings.

Add to this the newfound problems in another big use area for chemicals—agriculture—and the picture gets even more dismal. Any pickup in currently depressed fertilizer use will not help chemical producers until sometime next year. Even the highly profitable pesticides market is experiencing trouble as farm income continues to sink.

Farmers apparently are forgoing many types of crop protection this year. One source says that farmers seem to be applying the cheapest pre-emergent weedkillers they can

find. When crops come up, they then decide whether extra grain they may get from additional application of herbicides will be worth the cost. Many times, the answer is no.

As a result of such woebegone markets, basic chemical company earnings were off on a year-to-year basis more than 30% for the second quarter in a row. In the second quarter, combined earnings of the 40 largest chemical companies dropped 35.5% to about \$921 million from the second quarter last year.

Even more important, for the third quarter in a row, sales of the 40 companies were down from the year-earlier quarter. In the fourth quarter of 1981, sales were off 1%. In the first quarter this year, they were down about 6%. Sales in the second quarter were down 7.6% to \$21.2 billion.

The situation is bad enough that running 12-month chemical sales are falling. During the past year, from the third quarter of 1981 through the second quarter of 1982, sales for the 40 companies have fallen to about \$74.7 billion, 2.6% below sales in the comparable period of 1980-81. At the same time earnings are off 17.2% to \$3.4 billion. The result is that running 12-month profit margins have fallen to an average of 4.6% from 5.4%.

In the second quarter this year, the smaller companies on the list as usual outperformed the larger companies—or possibly just didn't do so poorly. Combined sales for the 20 larger companies amounted to \$18.7 billion, 7.9% less than in the same period last year. Earnings for this group fell 35.6% to about \$788 million. Average profit margin for the 20 larger firms dropped to 4.2% from 6.0%.

Among the 20 smaller, largely specialty chemical firms on the list, sales fell an average of 4.6% from second-quarter 1981 to a total of \$2.47 billion. Earnings for these companies totaled \$133 million, a drop of 34.7% from last year. Profit margins for this group remained considerably higher than those for the larger group, but they were falling fast. The average profit margin for the 20 smaller chemical companies in the second quarter this year was 5.4%, compared with a profit margin for this group of companies of 7.9% in the second quarter of 1981.

The second-quarter results merely reinforced earlier 1982 performance. For the first six months, earnings for the 40 companies were down 34.1% from the first six months last year to \$1.84 billion. Sales for the group fell

Earnings are also down at most diversified chemical producers

	% chemical sales	SECOND-QUARTER 1982						FIRST-HALF 1982		
		Sales		Earnings		Change from 1981		Profit margin ^a		Change from 1981 Sales
		(\$ millions)		Sales		Sales		1982	1981	
Du Pont	34%	\$8472.0	\$247.0	4%	0%	2.9%	3.1%	\$16,761.0	\$497.0	3%
General Electric	4	6632.0	465.0	-5	7	7.0	6.3	12,655.0	842.0	-3
U.S. Steel ^b	10	5100.0	4.3	35	-97	0.1	4.4	10,100.0	84.2	40
Dart & Kraft	11	2497.7	105.3	-4	-19	4.2	5.0	4,937.1	202.2	-1
Eastman Kodak	23	2430.5	248.3	1	-13	10.2	11.8	4,678.1	429.6	-1
Goodyear Tire & Rubber ^c	12	2290.2	63.3	-3	-29	2.8	3.7	4,437.5	108.9	-3
Beatrice Foods ^c	5	2277.7	71.3	2	-7	3.1	3.5	4,505.3	145.3	3
3M	15	1687.0	158.6	1	-8	9.4	10.3	3,353.0	311.1	3
Georgia-Pacific ^{b,c}	14	1415.0	71.0	-2	29	5.0	3.8	2,614.0	96.0	-6
Aluminum Co. of America ^c	11	1239.5	15.1	-5	-81	1.2	6.2	2,245.3	39.0	-6
Borden ^c	32	1039.0	32.0	-14	-20	3.1	3.3	1,967.2	49.2	-13
Martin Marietta	14	909.7	40.2	3	-34	4.4	6.9	1,694.3	56.0	6
Pfizer	13	875.3	80.6	10	25	9.2	8.1	1,683.7	168.8	5
Diamond Shamrock ^c	34	857.7	31.9	6	-42	3.7	6.8	1,648.8	61.1	-2
Borg-Warner	24	844.2	46.7	5	11	5.5	5.2	1,581.5	83.0	1
Kaiser Aluminum	17	814.9	-30.0	-9	def	def	7.7	1,548.7	-54.9	-10
Esmark	18	814.6	28.2	3	-13	3.5	4.1	1,539.8	41.7	5
Merck	23	774.6	111.3	4	3	14.4	14.6	1,518.1	221.1	3
Eli Lilly	18	708.2	93.2	13	22	13.2	12.2	1,571.4	228.8	9
Northwest Industries	6	671.5	76.7	-14	27	11.4	7.7	1,465.9	171.3	-1
NL Industries	21	632.4	73.1	3	0	11.6	11.9	1,297.7	166.5	13
General Tire & Rubber ^c	15	585.6	25.0	4	36	4.3	3.2	1,042.3	21.2	-2
Uniroyal ^c	28	541.0	8.1	-14	-71	1.5	4.4	1,026.1	9.3	-12
Upjohn	17	475.8	38.4	-7	-14	8.1	8.7	936.1	81.3	-6
Emhart	16	459.7	18.2	4	-14	4.0	4.8	908.7	38.3	4
Engelhard ^c	11	447.4	16.3	3	-21	3.6	4.8	883.3	30.5	-22
Koppers	34	443.4	7.6	-18	-53	1.7	3.0	798.7	-3.1	-17
Cabot	30	404.6	24.6	-3	-17	6.1	7.1	823.7	51.4	0
Tyler	36	221.6	3.4	18	-59	1.5	4.3	429.0	3.4	31
Big Three Industries	32	194.7	22.1	-3	-17	11.3	13.2	407.5	48.6	2

a After-tax income as percentage of sales. b Earnings include major nonrecurring items. c Excludes major nonrecurring items: Goodyear—\$17.2 million in second-quarter 1982; Beatrice Foods—\$31.9 million in second (first fiscal) quarter 1982; Georgia-Pacific—\$130 million in first-quarter 1982; Aluminum Co. of America—\$19.9 million in first-quarter 1982; Borden—\$10.4 million in second-quarter 1982 and \$17.6 million in first-quarter 1982; Diamond Shamrock—\$35.5 million in first-quarter 1982; General Tire—\$4.9 million in second-quarter 1982, \$30.8

6.8% to \$42.1 billion. As a result, profit margin was down to 4.4% from 6.6% in the first half of 1981.

Again, the smaller firms performed less poorly than the larger companies. First-half sales for the 20 larger firms dropped 6.9% from a year before to \$37.2 billion, and earnings dropped 34.6% to \$1.58 billion. Profit margin fell to 4.3% from 6.0%.

At the 20 smaller firms, sales in the first six months of 1982 dropped 5.5% from a year earlier to \$4.88 billion. Earnings for this group fell to about \$264 million, 31.3% below levels in the first six months of 1981. As a result, profit margin for the group dropped to 5.4% from 7.4% in the first half last year.

These horrendous results have caused many companies to lower various budgets for the year, notably capital spending. For example, B. F. Goodrich has cut about \$150 million

from its capital budget for 1982, although chairman John D. Ong says that the company is continuing most key expansions and modernizations in growth businesses. Goodrich also has taken other cost-cutting steps, including temporary salary and vacation reductions and increased attention to management of working capital.

Air Products says that it is adjusting to the recession by reducing capital expenditures, curtailing discretionary expense programs, and further emphasizing energy efficiency and productivity improvements. Chairman Edward Donley also says, "We are proceeding with major investments in industrial gas facilities under long-term contract but are trimming \$25 million to \$50 million in spending for distribution and support equipment from this year's \$400 million capital program."

At Dow Chemical, executive vice president and chief financial officer Robert M. Keil says that the company has made substantial progress on internal cost controls. A freeze on salary increases and other economies has saved some \$150 million in pre-tax earnings in the past six months.

Chemical executives are unsure as to what lies ahead, but most feel that even if a recovery comes late in the year, it will not be so substantial as they would like.

Pennwalt chairman Edwin E. Tuttle says, "We're all aware that the U.S. is in a deep and continuing recession, and our results clearly reflect that condition. We remain confident, however, that our government is on the proper course and that a recovery will be evident by the end of the year."

Cyanamid chairman James G. Affleck sees no indication that economic

FIRST-HALF 1982			STOCK MARKET DATA							
Change from 1981	Profit margin ^a		Earnings per share		Stock price			Price-earnings ratio	Annual indicated dividend	Dividend yield, % of price
Earnings	1982	1981	July 30	Recent 12 months	July 30	Recent 12 months High	Low	July 30		
-12%	3.0%	3.5%	\$1.03	\$5.53	\$30 1/4	\$47 7/8	\$30	5	\$2.40	7.9%
6	6.7	6.1	2.05	7.48	65 3/4	69 7/8	51 1/8	9	3.40	5.2
-81	0.8	6.0	0.05	3.27	17 3/4	32 3/4	17 1/4	5	2.00	11.3
-13	4.1	4.6	1.93	6.89	53 3/4	54 3/4	44 5/8	8	3.60	6.7
-19	9.2	11.3	1.52	6.99	75 5/8	78 5/8	60 5/8	11	3.00	4.0
-25	2.5	3.2	0.85	2.83	23 1/4	26	15 7/8	8	1.40	6.0
-2	3.2	3.3	0.65	2.81	20	22 1/4	16 3/4	7	1.50	7.5
-9	9.3	10.5	1.35	5.48	53 1/8	57 3/8	48	10	3.20	6.0
-10	3.7	3.8	0.66	1.38	14 7/8	26 1/8	13 1/4	11	1.20	8.1
-79	1.7	7.0	0.19	1.84	23 1/2	29 1/2	21 7/8	13	1.80	7.7
-32	2.5	3.2	1.08	4.50	33	35 3/4	26 3/4	7	2.22	6.7
-44	3.3	6.3	1.13	4.27	23 7/8	40 1/2	22 1/4	6	1.92	8.0
21	10.0	8.7	1.04	3.96	55 3/4	62	40	14	1.84	3.3
-47	3.7	6.9	0.51	2.81	17 3/8	37 3/8	17 1/4	6	1.76	10.1
8	5.2	4.9	1.10	4.18	25 3/8	29 1/4	21 1/8	6	1.40	5.5
def	def	7.9	-0.70	-1.38	12 1/4	21 3/8	12	def	0.60	4.9
-7	2.7	3.0	2.19	7.37	41 1/2	55 1/2	39 7/8	6	1.84	4.4
0	14.6	15.0	1.51	5.39	69 7/8	93 3/8	64 3/4	13	2.80	4.0
14	14.6	14.0	1.23	5.30	54 3/4	65 1/4	45 1/4	10	2.60	4.7
57	11.7	7.4	3.77	12.86	45	80 1/2	46 1/4	4	4.40	9.8
27	12.8	11.4	1.12	5.18	16 3/8	48 5/8	16 5/8	3	1.00	6.1
-12	2.0	2.3	1.06	3.02	22 1/2	26 5/8	17 7/8	7	1.50	6.7
-76	0.9	3.3	0.25	0.59	7 3/8	9 3/4	5 7/8	13	0	0
-20	8.7	10.2	1.28	5.36	39	59 3/8	38	7	2.28	5.8
39	4.2	3.1	1.50	6.74	28 3/4	36 1/4	26 1/8	4	2.40	8.3
-14	3.7	3.1	0.60	2.47	20 5/8	25 1/2	17	8	0.56	2.7
def	def	1.3	0.20	1.01	11 1/2	23 3/8	11 1/4	11	1.40	12.2
-15	6.2	7.3	0.77	3.12	16 3/4	35	16 1/4	5	0.92	5.5
-74	0.8	4.0	0.36	1.91	13 7/8	25 3/4	12 1/8	7	0.60	4.3
-8	11.9	13.2	0.52	2.48	18	35 3/4	16	7	0.72	4.0

million charge in first-quarter 1982, and \$4.4 million charge in first-quarter 1981; Uniroyal—\$18.0 million in first-quarter 1982; Engelhard—\$5.2 million in second-quarter 1981. def = deficit.

conditions will change quickly. He does say, however, "We do believe there will be some improvement later in the year. When this occurs, we are confident that our basic competitive strength will allow us to resume our growth at a rapid pace."

And Alexander F. Giacco, chairman and president of Hercules, says, "As to an anticipated recovery, the industry segment of the economy which is capital-intensive will show progress once the federal government resolves its financial problems. The budget situation has caused shortages of capital and, consequently, extraordinarily high interest rates. The resolution of this problem is necessary to restore confidence not only in financial markets but in consumer attitudes as well."

At Du Pont, which is benefiting hugely this year from its Conoco acquisition as a counterbalance for

chemical profit declines, chairman Edward G. Jefferson still takes a cautious view toward the rest of 1982. "In the third quarter thus far, our business shows no evidence of recovery and has declined in some sectors which are affected by customer vacation shutdowns. We expect to see modest improvement in general economic activity in the fourth quarter. An end to inventory liquidation, the personal income-tax cut, and the lower rate of inflation should all help bring improvement. However, substantially lower interest rates appear to be a prerequisite for vigorous recovery."

Du Pont so far can laugh at critics of its mammoth Conoco takeover last fall. A \$97 million after-tax second-quarter income turnaround at Conoco's coal operations plus a \$46 million drop in interest and other corporate expenses largely balanced a \$150

million earnings falloff in the old Du Pont company operations. The Conoco petroleum operations, unlike oil companies in general, had slightly rising earnings. As a result, Du Pont's second-quarter earnings, on a pro forma comparison with combined Du Pont-Conoco results for second-quarter 1981, came out just about even with 1981—one of the best performances of any large company.

Even so, Du Pont's chemical earnings figures underscore the chemical industry's financial bath. In the company's three main chemical groups, second-quarter after-tax operating income fell 30% in polymers, 44% in agricultural and industrial chemicals, and 82% in fibers.

In sum, the deep chemical recession has carved a second miserable quarter for 1982 this spring and will make another one this summer. An upturn is not yet in sight. □

Losses plague Canadian chemical companies

C-I-L is the only one of the five big chemical companies that posted a profit in this year's first half; together, the five lost \$3.6 million

Canada continues to languish in its deepest economic slump since the 1930s. For the country's chemical industry, the impact of that slump is unmistakably severe.

Sales are down. Profits have disappeared for many companies. Those few companies that have managed to remain in the black for the first six months of the year have done so only by the slimmest of margins.

The combined results of five major Canadian chemical companies charted by C&EN underscore the tailspin that the industry has been in for the past two years. The companies are C-I-L, Celanese Canada, Du Pont Canada, Polysar, and Union Carbide Canada.

In the second quarter of 1980, the combined earnings of these companies hit a record \$79.2 million (Canadian). By the second quarter of last year, those earnings dipped to \$66.5 million.

This year, those same five companies registered a painful loss of \$4.3 million in the second quarter. For the first six months as a whole, their combined results amounted to a loss of \$3.6 million.

C-I-L's chairman and chief executive officer Wilfred J. Mandry complains, justifiably, about the adverse effect of the recession and continuing high interest rates on his company's performance. Indeed, C-I-L's six-month sales were down 3% and earnings were off a hefty 50%.

Nevertheless, C-I-L is one of the lucky ones. It at least has managed to show a profit so far this year. That's something that has eluded the other four of the five companies. Polysar was the only one of the five to boost sales over last year's first half, but it still suffered a \$10.2 million loss for the first six months of this year. Celanese Canada sported a \$2.5 million deficit; Du Pont Canada's was \$1.9

million; and Union Carbide Canada's was \$5.7 million.

Throughout the industry, the story is the same: poor sales volume and inability to pass along cost increases in the form of higher prices.

Particularly outspoken is Union Carbide Canada's chairman John S. Dewar. He blames Canada's energy policy for increasing raw material costs to crude oil-based petrochemical producers 15% in the past nine months while costs on the U.S. Gulf Coast declined. And he warns that the future of the Canadian petrochemical industry depends on the government's recognizing the industry's highly competitive international nature.

Throughout the industry, too, reactions to sharply lower sales and income losses are similar. Companies are curbing capital spending to conserve cash. Some projects are being delayed, others scrapped entirely.

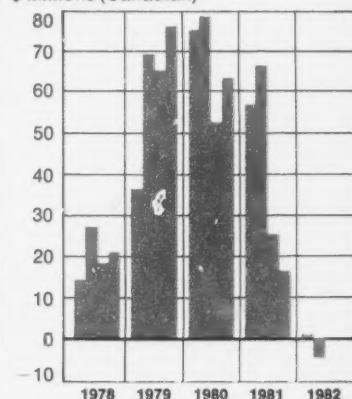
Many firms are closing plants or at least cutting production to trim inventories or to keep in step with sharply lower demand. Layoffs are commonplace. Dividends are being cut or eliminated. Many workers are finding their salary increases restricted—or rescinded.

It's hard to imagine that things could get worse. But, given Canada's economic climate and poor recovery prospects, that's exactly what could happen.

C-I-L's Mandry says that the adverse impact (on sales and earnings) of the country's poor economy will be "accentuated" in the third quarter. One reason: Many of C-I-L's resource-oriented customers plan long

Combined earnings drop into the red

\$ Millions (Canadian)*



* After-tax earnings of five largest publicly reporting Canadian chemical companies—Celanese Canada, C-I-L, Du Pont Canada, Polysar, and Union Carbide Canada.

summer shutdowns. Another: The construction industry is in the doldrums.

James E. Newall, chairman and chief executive officer of Du Pont Canada, agrees that the outlook for the third quarter is poor. He expects his company to operate at less than 50% of capacity during July and August.

Some Canadian economists have said that they see mildly encouraging signs in recent economic developments. But they are a minority. Optimism is a rare commodity in Canada these days, particularly in the chemical industry.

Earl Anderson, New York

First half is financial disaster for Canadian chemical firms

FIRST SIX MONTHS, 1982

\$ Millions (Canadian)	Net sales	Change from 1981	Net income ^a	Change from 1981	Profit margins ^b	
					1982	1981
C-I-L Inc.	\$ 595.8	-3.2%	\$16.7	-50.1%	2.8%	5.4%
Celanese Canada	155.7	-19.4	-2.5	def	def	6.6
Du Pont Canada	511.6	-14.2	-1.9	def	def	4.8
Polysar Ltd.	704.4	2.6	-10.2	def	def	3.3
Union Carbide Canada	356.6	-15.0	-5.7	def	def	6.4
TOTAL	\$2324.1	-7.5%	\$-3.6	def	def	4.9%

^a Net income from continuing operations, excluding extraordinary gains or losses. ^b Net income as a percentage of sales. def = deficit.

Pentagon dickers with chemical firms
on nerve gas production Page 32

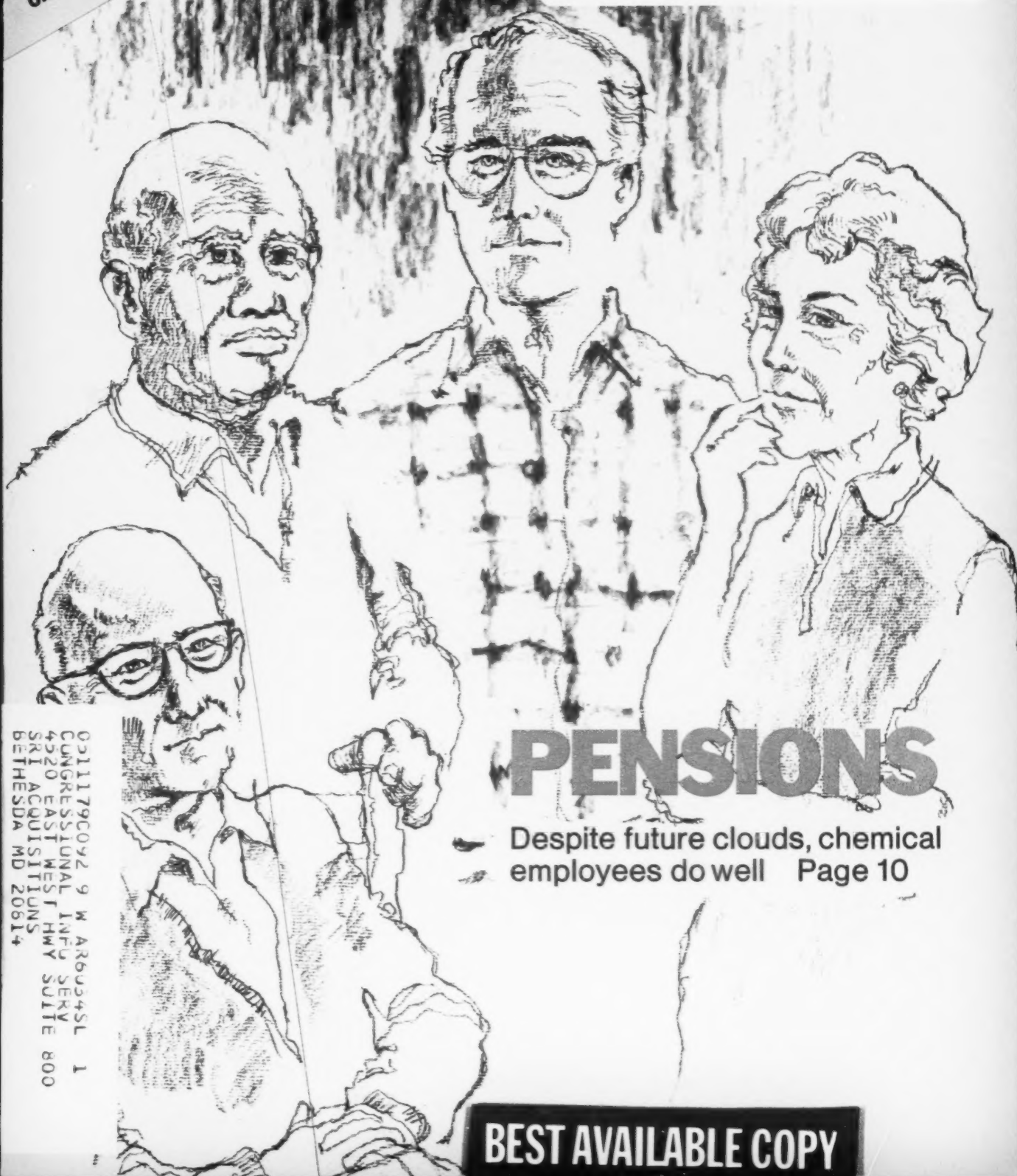
Chemical &
Engineering

NEWS

August 23, 1982

A1250-1

3/20/82



PENSIONS

Despite future clouds, chemical
employees do well Page 10

0911179C092 9 W AR6034SL 1
CONGRESSIONAL INFO SERV
4920 EAST WEST HWY SUITE 800
SRI ACQUISITIONS
BETHESDA MD 20814

BEST AVAILABLE COPY

Cover: Illustration by Bill Balou

4	Letters
5	Editor's Page
Concentrates	
16	Business
30	Government
43	Science/Technology

The Departments	
39	New Products
54	Meetings
56	Newsclips

News of the Week

- **Although the fertilizer market has been weak this year and inventories have piled up, industry experts say oversupplies aren't so bad as they look.** **Page 6**
- **Appeals court disallows EPA's expansion of bubble concept to let plants average pollutant emissions in areas not meeting air quality standards and to include an entire plant as a new pollution source.** **Page 6**
- **Occidental Petroleum's bid for Cities Service is temporarily in limbo; if merger comes about, combined sales of about \$24 billion will put the joint company among the top 10 U.S. chemical producers.** **Page 7**
- **Better understanding of Lesch-Nyhan syndrome, which causes excess production of uric acid, may be possible with the isolation of the gene that causes it.** **Page 8**
- **Chemical stocks were among the gainers when an emotional outburst typical of Wall Street followed a prediction that interest rates soon would fall sharply; among big winners were Union Carbide and Monsanto.** **Page 8**

News Focus

- **Collection on retirement pensions appears certain for chemical industry personnel, but changing demographics may paint a different future picture for pension plans and alternatives may be sought.** **Page 10**

Business

- **Hydrazine producers counting on product's wide range of uses to pull through the recession and make a fast comeback despite current soft market.** **Page 23**

International

- **Developing nations' chemical exports have been rising faster than those in industrialized countries.** **Page 26**

Government

- **Army's search for firms to make nerve gas chemicals finds small firms agreeable; large companies consider manufacture unattractive economically.** **Page 32**
- **President Reagan's science policy attacked by Republican Sen. Harrison Schmitt; cites neglect of space science, health care, agriculture, transportation.** **Page 40**

Science

- **ZTP, a member of the cell-growth regulators called alarmones that help bacterial cells respond to metabolic stress, discovered by UCB biochemists.** **Page 44**
- **Seeking the methylene radical in interstellar space becomes more intense as clues to its rotational transition are found.** **Page 45**

FERTILIZER SLUMP NOT SO BAD AS IT SEEMS

August 1982 would be an excellent time to see silver linings in the U.S. chemical economy, since there is such an abundance of clouds and few even half-confident forecasts of recovery. Possibly Wall Street has done just that in last week's stock price surge (see page 8). And in one of the most disappointing chemical markets of the past year, fertilizer, another noted industry analyst is trying to see the bright side.

Economist Edwin A. Harre and colleague Norman L. Hargett of Tennessee Valley Authority's National Fertilizer Development Center argue that the oversupplied fertilizer scene, tracked through key inventory data, isn't quite so bad as it looks. They don't deny that the U.S. fertilizer market, after a year with an 11% drop in domestic use and an 18% sag in exports as measured by the Fertilizer Institute (C&EN, Aug. 9, page 7), is weak. Great tonnages of inventories have piled up, reinforcing problems in prices and profits bemoaned by producers in mid-year reports.

At a TVA fertilizer conference in St. Louis, Harre noted, for example, that nitrogen stocks peaked in 1978, with inventories equivalent to about 31% of total production. Stocks decreased slowly, to about 18% by 1981, but then rose again to 21% in April 1982. Inventories have been a problem, and a primary cause of softness in prices, Harre concedes.

From another perspective, however, nitrogen inventories really aren't that far out of line. The April level was above the normal 10 to 20% range, but only by a little. And the spring planting season was up to a month late in many parts of the U.S. "If the fall market should come early this year, or the nitrogen export market again becomes active, or the industrial market begins to recover, there is little excess supply available from inventory," Harre comments.

Many ammonia plants have closed in response to higher inventories and falling prices. However, Harre says, that isn't a short-term trend. There's been a steady decline in U.S. ammonia capacity, from a peak of 22 million tons in 1978 to a current level of about 20 million tons. Even so, with recent and pending expansions

Potash inventories reach new high

	Inventories as percentage of production ^a		
	1982	1980	1978
Nitrogen	21%	20%	31%
Phosphorus	8	6	7
Potash	26	11	20

^a As of April 30. Source: Tennessee Valley Authority

in Canada, Mexico, and Trinidad, the U.S. will have an ample potential supply within the Western Hemisphere.

Similarly, April phosphate inventories exceeded 800,000 tons of P_2O_5 , compared to the 300,000- to 400,000-ton levels of 1973 and 1977, Harre says. However, that tonnage—about 8% of total production—represents only the normal inventory level needed at the beginning of the spring fertilizer season. With a return to normal demand, the current inventory would be depleted quickly, leading to another runup in prices until production could be expanded to meet the demand.

Responding to large export increases in the late 1970s, many phosphate producers began expansion programs. But although most of the new plants have been completed, the increase in net capacity has been

small because of recent plant closings, Harre says. The industry has ample idle capacity; any long-term shortage is unlikely unless this idle capacity is abandoned before the market improves. In the short term, however, the industry may see shortages brought on by producer miscalculations of total U.S. and export needs, Harre adds.

Potash producers have had the biggest changes in inventory levels, Harre says. Between August 1981 and April 1982 potash stocks more than doubled, from 1.2 million tons of K_2O to more than 2.5 million tons. During the year, shipments within the U.S. were down about 14%, and exports declined more than a third. April inventories—about 26% of total production—were "higher than desired" and exceeded earlier peaks in 1971 and 1976. In both those instances, Harre notes, four years later stocks had dropped from a high of 25% to well under 10% of production.

Although there is ample supply to avert any shortage in the coming year, Harre says that producers have begun to react to the situation. Production cutbacks in the U.S. and Canada in recent months total almost 1 million tons, and some expansion plans have been delayed. In May and June, potash stocks declined more than 500,000 tons. □

Court bursts EPA's expanded bubble idea

A federal appeals court in the District of Columbia ruled last week that the expansion of the "bubble" concept made by the Environmental Protection Agency last October is not permissible. The decision by the three-judge panel, written by Judge Ruth Bader Ginsburg, says that EPA's changes are against the intentions of the Clean Air Act as written by Congress.

The bubble idea began in the Carter Administration to be used in areas that already had attained the air quality standards. An industrial plant in those areas could average emissions from all units within the plant as a pollution source and add new units by cutting pollutants somewhere else, as long as the total pollution did not increase.

This concept was expanded by EPA Administrator Anne M. Gorsuch last year, who believed there were so many restrictions under the current plan that almost no company could qualify. Gorsuch would permit bubbles to be used in areas that had not met the air quality criteria, and changed the definition of a new pollution source to be an entire plant, not just a new boiler or other unit at the existing site.

The change, as could be expected, had much industrial support, including the Chemical Manufacturers Association, the American Petroleum Institute, the American Iron & Steel Institute, and General Motors.

But environmental groups took umbrage, and a suit to stop the change was filed by the National

Chemical industry pensions in good shape

The vast majority of workers in the industry can be reasonably sure of someday receiving their pensions, but changes in demographics may mean shifts in emphasis

Patricia Layman
C&EN, New York

As a general statement, the numbers sound grim: About half of all private-sector employees are covered by no pension plan, and half of those who are covered have no vested benefits at their current job.

But contrast those grim statistics with these: 97% of all chemical companies in the most recent U.S. Chamber of Commerce study reported paying pension premiums; by another estimate, more than 90% of chemical company employees are covered by plans; the chemical industry's net assets for pensions are more than 99% of its total vested-benefit obligations.

In short, pensions in the chemical industry are in remarkably good shape, and the vast majority of workers in the industry can be reasonably sure of someday receiving their pensions.

Pension funds now account for more than \$900 billion, for all private pensions, and that sum is rapidly nearing the \$1 trillion mark, about triple what it was a decade ago. The

chemical industry accounts for little less than \$20 billion of that, with the major chemical producers' plans totaling nearly \$17 billion. In fact, in its yearly ranking of pension funds, *Institutional Investor*, a financial investment magazine, pegged Du Pont's pension plan the sixth-largest plan in the country. The magazine calculates Du Pont's pension assets at \$5 billion, less than the \$6.2 billion listed in the firm's annual report but enough to fix the company solidly with General Electric, General Motors, Ford Motor Co., and U.S. Steel. American Telephone & Telegraph topped the list at \$35.5 billion in its pension fund.

Major chemical companies also account for more than 90% of the more than 920,000 employees estimated to work in the U.S. chemical industry last year. Given the general pension-plan coverage the major companies offer—including opening pension plans even for part-time employees—and the general matching of these plans by other firms to maintain their competitiveness as employers, these factors boost the overall percentage of chemical workers covered by pensions.



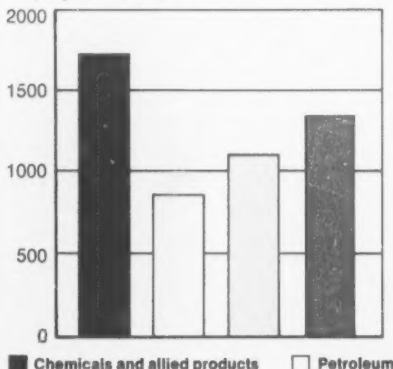
Romig: contain benefit costs.

All this comes as no surprise to Michael J. Romig, director of the Human Resources & Employee Benefits Section of the U.S. Chamber of Commerce.

"The chemical industry is not, for the most part, characterized by small firms," he says. "For the large com-

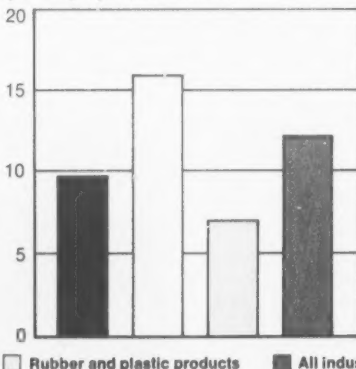
Chemical companies' average cost per employee tops industry averages

Average pension cost per employee in 1980, \$

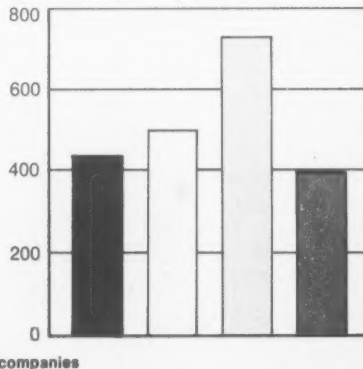


Source: Johnson & Higgins

Average change in pension costs per employee, 1979 to 1980, %



Average net pension-plan assets per company in 1980, \$ million



panies, the 'pension issue' is whether they have taken on too much in terms of benefit costs, and how they can contain them."

Nor does it surprise pension-plan managers in outside companies such as insurance firms, or consultants, who try to gauge the soundness of pension plans. Annual reports provide a general look at plan funding, under the dictates of federal regulations and accounting standards, showing plans' net assets available for pension benefits and the total accrued benefits. Different measurements are used for the two categories, so direct comparison cannot be made—if not apples and oranges, then at least Jonathans and Grimes Goldenes. But they can give rough indications of what surveys by employee-benefit consultants pin down more precisely.

For example, in its survey for 1980, issued earlier this year, New York City-based Johnson & Higgins determined that net assets as a percentage of total accumulated benefits for chemical companies was 98.4%, which compares favorably to the 97.6% in the petroleum industry, and the 76.5% reported for rubber and plastics producers.

Other measurements throughout the Johnson & Higgins survey, and in Chamber of Commerce surveys, give similar results. Overall, the chemical industry, in terms of benefit performance, ranks second only to the petroleum industry in manufacturing rankings, with "manufacturing" as a category outperforming the non-manufacturing sector with its many service-oriented, smaller companies—just the kind of companies that tend not to have pension plans.

For chemical employees, then, the keys to ensuring a pension are to work for a larger company, and to work there long enough.

Since the passage in 1974 of the Employee Retirement Income Security Act (ERISA), the time allowed for an employee to obtain vested rights to a pension has been trimmed, and the trend is toward even shorter vesting periods. But some people think it's still not short enough. The working world today clearly is different from the days when the concept of a pension originated as a reward for long and faithful service. Statistics now indicate that, on a national basis, the average employee changes employers every four years. As a result, the concept of a pension is shifting to that of deferred wages—wages held back from the employee during his or her working

How pension fund liabilities are determined

Under Internal Revenue Service rules, companies are permitted to amortize their past-service costs for pension liability funding over any time period from 10 years to 30 years (or 40 years, for new plans). To determine how much a company would owe each year, then, such depreciation either would condense or stretch the amounts owed and the payments.

The most conservative method of funding would be to amortize the costs over the minimum 10 years—each year's payment would be roughly one tenth the total.

Correspondingly, the most liberal accounting procedure would be amortization over 30 years—a longer time over which to spread a given amount of payment. With such a liberal plan, however, chances are that for older workers—those 50 years of age, for example—a company still might be funding benefits for such workers after their deaths.

Many pension-plan administrators believe that a responsible midpoint in that continuum is amortization of costs over the working life of the employee, on an aggregate level. It's more than 10 years, but much less than 30 years. That method, planners feel, helps ensure that

a company has the funds to pay for each worker at retirement. The method is conservative without being stuffy, adds one administrator, but "it's not off the wall."

Another means to measure pension funding lies in the accounting requirements for asset disclosure in corporate annual reports. This becomes a snapshot of what the company's liabilities are today, and whether it is ahead of or behind the game. Generally included are statements of the net assets available for benefits, and the actuarial present value of accumulated plan benefits, including those vested and nonvested. There are several weaknesses to such reporting. First, there is a major variable in the calculations, in the rate of return which is assumed. For example, if a company assumes a 20% rate of return, it needs very few assets to start with—on paper. Therefore, by pushing up the interest-rate assumptions, a company can understate its true liabilities, and improve what otherwise might seem a lackluster underfunding of a plan. Second, such reporting is, in essence, frozen into time, and doesn't allow for future wage increases. On balance, however, it's acceptable for a snapshot of today.

Most major firms have sufficient assets to cover benefits

\$ Millions	Net pension-plan assets available for benefits	Vested accumulated plan benefits (present value)	Nonvested accumulated plan benefits (present value)	Assumed rate of return, %
Du Pont	\$6198	\$4195	\$ 77	10.4 %
Dow Chemical	1026	867	188	8
Monsanto	1358	1221	157	7.5
Union Carbide	1683	1239	108	9
Celanese	529	271	11	8.25
W. R. Grace	312	215	17	6.4
Allied	779	822	47	8
Hercules	505	371	17	8
American Cyanamid	541	462	8	8.5
Rohm & Haas	358	265	2	8.5
Stauffer Chemical	234	143	20	7
Ethyl	291	223	18	6
FMC	529	432	33	8
Air Products	136	82	15	7
International Minerals	120	124	16	7
Olin	362	306	21	7
B. F. Goodrich	468	549	58	9
PPG Industries	529	488	57	9
Williams Cos.	62	48	3	7
Reichhold Chemicals	35	32	3	8.5
Lubrizol	34	24	2	6
National Distillers	251	175	12	12
Nalco Chemical	81	60	6	7

Source: Company annual reports, 1981